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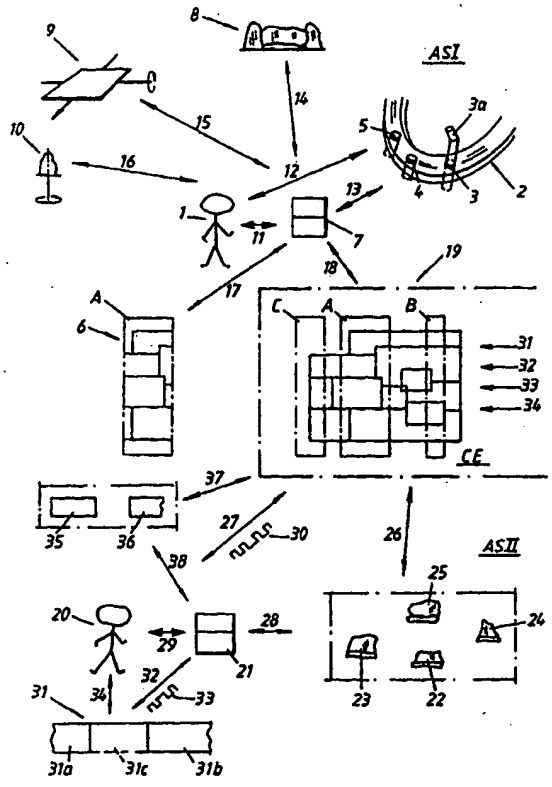
(57) Abstract

An operating site is used to assemble individually designed dental products, for example distancing pieces, bridges, etc. Each product consists of two or more structural elements. The operating site is provided with computer equipment which can reproduce a simulated model of the jaw, dentine, implant, etc., and structural elements applied to the model. The operating site is arranged to collate data in a query profile relating to part of the assembly. Members are included for transmitting query profile data via the network to the central unit. The central unit supplies information relating to the part in question. The information is sent to the operating site or to a production unit connected to the central unit for production of the part. A debiting system is arranged to indicate to the central unit or to the production site that the information or production, respectively, has been paid for.



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TITLE

Arrangement and system for production of dental products and transmission of information.

TECHNICAL FIELD

The present invention relates to an arrangement which makes it possible, at an operating site, to assemble individually designed dental products, for example distancing pieces, bridges, etc. Each dental product can in this case be made up from two or more structural elements. Each operating site is arranged with computer equipment with which it is possible to reproduce a simulated model of the jaw, dentine, implant, etc., and structural elements applied to the model. By means of interaction with the user, it is possible to adapt the constructional design of the respective assembled product to the dental situation in question. The operating site can be connected to one or more central units via a telecommunications and/or computer network, via which the central unit receives data from the operating site.

The arrangement can also be set up to permit manufacture of dental products, or instruments for the latter, at a number of geographically distinct manufacturing sites, where the manufacturing procedure can be effected in a number of manufacturing stages.

The arrangement can also be set up so that, at one or more manufacturing sites, it is possible to control a manufacturing procedure for a dental product, or instrument for the latter, where the procedure comprises one or more subsidiary stages.

The arrangement can also be set up to assemble qualified constellations at a dental user site, for example with regard to dental situations, dental information, dental test products, etc. The user site has access to its own results or one or more presentation banks which can be subject to factual information relating to, for example, verifications,

adjustments, complementary additions, etc. The user site can in this case be connected to one or more central units via a telecommunications and/or computer network, via which the user site and the central unit are capable of exchanging information/ data.

The invention is also applicable to a system for supplying dental products and preferably dental information relating to the products and dental situations and, if appropriate, also for making instruments for production of the product. A number of users using the system and constituting user sites can be connected to one or more central units, included in the system, via a telecommunications and/or computer network. The respective user site can in this case be provided with computer equipment by means of which query profiles can be collated.

STATE OF THE ART

It is already known to use mechanical, computer-aided methods for production of dental products such as caps, bridges, etc. Plaster models and the jaw, tooth remains, etc. of the patient can be scanned with the aid of various methods by the dental technician/dentist. The scanned information can be compressed and fed to the computer equipment, in which the model or equivalent can be simulated and, in the computer environment, can undergo constructional and add-on functions in order to obtain an optimum tooth replacement or equivalent for the patient in question. The result obtained can constitute the basis for ordering the actual dental product from a centralized manufacturing site. An order can be sent in a known manner to the manufacturing site or production site in question, which manufactures the desired dental product and sends this back to the orderer, who can then continue his work preparing and fitting the dental product on the patient.

In this connection, it is known to prepare not only tooth caps in this way, but also pontics, titanium crowns and bridge parts.

The users or the customers on the system thus provide for the system a work station which includes a standard PC with modem (or ISDN connection). The work station can be fitted out in various ways. Thus, for example, it can be equipped with a scanner device of the Procera type with associated user program.

DESCRIPTION OF THE INVENTION

TECHNICAL PROBLEM

The manufacturing process entails, overall, a very complex technique which it is not possible for each user/customer to perform. There is, however, a need for each user or customer to be able, to a greater extent than has hitherto been possible, to be able to gain access in a technically simple manner to all or parts of the complete process structure or process technique in order to obtain support, at the user site or customer site, for his own constructional and testing work on the respective patient. It is essential in this respect that use of the system is possible in a technically simple manner which has been well proven in the sector. The main object of the invention is to solve these problems.

There is also a need for the user to be able to subscribe to certain functions (structures) in the dental complex manufacturing process, which is being constantly updated and refined. Thus, for example, constant developments are being made on the software side, with the systems user (dentist/dental technician) wishing to make use of these developments in their daily application, without too much work on updating requirements. The dentist/dental technician may require new reading and data compression systems and new hardware for these. By means of the invention, it is possible, in a simple manner, to have updating provided

and installed in the customer equipment in a more or less automatic way.

Different users may be specialists in different dental products and dental situations, cf. titanium and ceramic crowns and bridges, and they may wish to consult the complex system only within their specialist area. The invention solves this problem too.

Users who need to use the complex system only now and then can also obtain help in a simple manner in the form of basic information. Thus, for example, it may be useful for a user/customer to find out about existing and well-proven constructions in specific dental situations. His/her work is made easier with a main-type solution to the specific dental situation. This is achieved, inter alia, by means of the fact that the system can give statistics and examples of use in different situations on which the user/customer/patient can base his solution.

Colleges and other educational institutions can also use the system as an information source for different dental situations and dental presentations.

It is also expedient, when using distancing pieces on or for implants, for these to be designed individually. The individual preparation can be based on information from the system, and the ordering and manufacture of the individually designed distancing pieces can be done with the aid of the system.

For the system provider, it is important to have a secure and reliable debiting system which executes debits for function uses and function means from the system and dental products or parts thereof manufactured in the system and instruments for the said products or parts. The invention solves this problem too.

There is a need to be able to expand the available equipment at the respective user site or customer site, and it is therefore desirable, for example, to be able to introduce and use a free-standing CADD program. As new software and hardware is

developed, this too will be able to be connected to the work station, which in this way will be able to use the system to an even greater extent. There is therefore a need to be able to create a general IT-based dental platform (IT = information technology). In this way the customer can work with a Procerar station and send his work to a production unit via a network. The production unit then manufactures the component concerned and sends this to the customer. It will be possible to deal with all the administration in the given network. The invention solves this problem too.

The system will be able to be set up for a large number of work stations (customers). Thus, for example, the system will be able to be set up for several hundred work stations which will be able to be connected in stages without disrupting the rate of production of dental products and the delivery of information. Software used in the system will be able to be updated with minimal disruption to the production of dental products and delivery of information. This places special requirements on the coordination within the system. It additionally places requirements on the program constructions and how the programs are installed in the system. The invention is intended to solve these problems too.

There is therefore a requirement to be able to use routines for product modifications, which modification routines will be able to be used both for software and hardware. It is therefore expedient to be able to create a platform for comprehensive dental rehabilitation systems while at the same time being able to maintain the rate of development within the system. It is expedient in this case to be able to create a number of rules which mean that the routines in connection with the system are actually used. The invention also solves this set of problems.

SOLUTION

The feature which can principally be regarded as characterizing an arrangement used at an operating site to assemble individually designed dental products is that the operating site is arranged to collate data in a query profile relating to part of the assembly. The operating site is provided with members for transmitting query profile data via the network to the central unit. The latter is arranged, as a function of the received query profile data, to supply information relating to the part in question. This information can be sent to the operating site and/or can be set onwards to a production unit connected to the central unit, or included in the central unit, for production of the part. A further feature is that a debiting system is arranged to indicate to the central unit or to the production site that the information or production, respectively, has been paid for.

The query profile data can relate to queries on first information concerning the dental situation, which can relate to optimum design and fitting of the part concerned in the dental product in question. In one illustrative embodiment, the dental product can consist of a distancing arrangement on an implant. The distancing arrangement comprises an angled distancing part or other part which has on or more individual parameters, e.g. shape, position of rotation about the longitudinal axis of the implant, etc. The angled distancing part or the said other part is dependent on the individuality of the dental situation. In a further embodiment, the query profile data and the first information afford the possibility of interaction between the operating site's computer equipment, its user, and the central unit for production of one or more structures adapted to the respective dental situation. In a preferred embodiment, a number of operating sites or customer sites are connected to the central unit and its production unit or production units. The operating sites are in this case categorized

and each category subscribes to a relevant service which effects first information and/or product parts from the total range or offered range of the central unit and/or the production unit or production units. The first information can in this case relate to one or more computer program information items or computer programs for carrying out the said assembly. The query profile data of the respective operating site and the information sent from the central unit/respective production unit can preferably relate to user data and setting data for the scanner unit, measuring table, etc.

An arrangement used at a dental user site to assemble qualified constellations can principally be regarded as being characterized by the fact that the user site/customer site is arranged to collate data in a query profile relating to all or part of the constellation. The user site is in this case provided with members for transmitting query profile data via the network to the central unit. The central unit is arranged, as a function of the query profile data received, to supply factual information relating to the constellation or the constellations, which information can be sent back to the user site for acting on the said results or presentation bank/presentation banks. A further characteristic is that a debiting system is arranged to indicate to the central unit that the factual information sent out has been paid for.

In one embodiment, the factual information sent out consists of second information on manufacturing process(es) and/or statistics relating, for example, to the construction of different main types of dental products. In one embodiment, the central unit can also function as, or be connected to, one or more production units for production of dental products. The central unit and/or the respective production unit is arranged to utilize and store characteristic data on the dental products, data on the respective dental situation in which the respective dental product is being used, etc.

In a preferred embodiment, characteristic data thus utilized and stored and dental situations can be interrogated by means of the said query profiles from one or more user sites connected to the central unit and/or the respective production unit.

The respective query profile data and returned information concern characteristics or construction information on different types of dental crown configurations which have been the object of production in association with manufacture/production controlled or managed by the central unit. The said types form main types which can each be supplemented by one or more variants.

An arrangement to permit manufacture of dental products, or instruments for the latter, at a number of geographically distinct manufacturing sites where the manufacturing procedure is effected in a number of manufacturing stages, is principally characterized in that a central unit supplies moduled information items and means for carrying out the stages, in which the different modules can be assigned to the different manufacturing stages or parts thereof. The different manufacturing stages are capable of interrogating and/or are assigned in advance one or more of the said moduled information items and means in order to be able to carry out all or part of the manufacturing process by means of the called-up information items and means. Transmission members are arranged, as a function of the requested order for called-up information and means, to effect transmission of these on a computer and/or communications medium which connects the respective manufacturing site to the central unit. In this case too, a debiting system is arranged to credit the central unit with payment for used time, information and/or means.

In a preferred embodiment, the customers are categorized in such a way that a first category of customer can be assigned first information and means, a second category of customer can be assigned second

information and means, etc. The said information and means can comprise control information for operating equipment for one or more of the said manufacturing stages at the manufacturing site.

An arrangement used at one or more manufacturing sites to control a manufacturing procedure for a dental product, or instrument for this, where the manufacturing procedure comprises one or more subsidiary stages, can principally be regarded as being characterized by the fact that the control information for equipment effecting one or more manufacturing procedures or subsidiary stages thereof can be extracted by a selection procedure from an information and/or data bank located in a unit geographically separated from the respective manufacturing site. Extraction is in this case carried out by means of the selection made at the respective manufacturing site, and the selection made can be transferred via a computer and/or telecommunications medium to effect selection in the information and/or data bank at the central unit. As a function of the selection, the central unit transmits the selected information and/or means. At the manufacturing site, the selected information received is arranged to be included in or be converted to control information for the equipment in question. Here, once again, use is made of debiting equipment which credits the central unit with payment for used time, information and/or means.

A system in accordance with the above can be regarded as being characterized by the fact that the said central unit(s) comprise(s) one or more coordinating units which, via a first telecommunications and/or computer network or a second local telecommunications and/or computer network, is/are connected to one or more production units. The respective coordinating unit is in this case arranged to effect or participate in the assignment of the information flows coming from the user sites/customer sites via the first telecommunications and/or computer

network (query profile data). The respective production unit functions as order receiver for the respective dental product which the respective user site wishes to have produced.

In a preferred embodiment, the respective user site is equipped with functions for reading off the model or jaw, dentine, etc., of the patient. The reading result can be fed to the user site's computer equipment, and a query profile (systems user profile) effected by this means includes one or more tasks. The respective coordinating unit preferably functions as a connection station to a network (telecommunications and/or computer network) belonging to the system. Two or more coordinating units distribute the incoming query profile flow (systems user flow) and the flow of information coming from the coordinating units, which information, for example, will be controlled for access to different databases. The system capacity can be expanded by means of connection of further coordinating units and/or inclusion of more powerful computers in existing coordinating units and/or connection of several ISDN modems.

Further characteristics of the system will be evident from the subsequent system subclaims.

ADVANTAGES

The features proposed above provide a system and a user relationship characterized by economic application of the system from the viewpoint of the user sites/customers. Use is based on technology which is known per se, and which further affords simplified use procedures for the users, while maintaining economic advantages. The users, i.e. dentists/dental technicians, can make use of the advantages obtained through high manufacturing operations, involving substantial economic and technical outlay. By means of the fact that subsidiary functions, statistics, etc., are offered for sale in the large system, the developments in this system can benefit the users

against payment for only the desired use. Very considerable experience of manufactured products, product designs, etc., can be built into and stored in the system. The stored information can be used as basic information for the users and for statistical application in association with colleges and other institutions. In addition to offering accurate and exact products, the system provider can receive payment for continued development and research. The very substantial development of the databases in the coordinating units means that it is possible to follow everything that is going on in the system. Production can be constantly modified and administrative functions can be applied in the databases in order to facilitate the development work. Despite the information content being transferred in the proposed manner to the user sites/customers, the required accuracy of the products can be maintained. The required accuracy nowadays is about 2/100ths tolerance.

DESCRIPTION OF THE FIGURES

A presently proposed embodiment of an arrangement and a system according to the invention will be described hereinbelow with reference to the attached drawings, in which:

Figure 1 is an outline diagram showing the connection of two user sites/customers to a central unit, where the two users or customers represent different categories for use of different functions in the complex system at the central unit,

Figure 2 is an outline diagram showing the connection of the user site/customers to production units via a network of the Procera type,

Figure 3 shows, in a block diagram, the structure of a user site,

Figure 4 shows, in a block diagram, the structure of a coordinating unit in the network according to Fig. 2,

Figure 5 shows the flow of information, of query profile data from the user site, being received in a coordinating unit, and

Figure 6 shows databases in the production units and coordinating units connected to the databases and EQL database applications.

DETAILED EMBODIMENT

In Figure 1, a first user is indicated by 1. The user works, inter alia, with a model 2, in which implants 3, 4, 5 are arranged. In or on the implant 3 there is an angled distancing piece 3a which is individually designed for the patient/dental situation in question. The user 1 has a production resource 6. A user site for the user 1 is indicated by ASI. The user 1/user site ASI has access to computer equipment 7. The user 1 can also work with a dental product in the form of a dental bridge 8. In addition to the product resource 6 and other equipment, the user/user site can have access to levelling table 9 for production of the dental product, reading equipment 10, etc.

The manufacturing method for producing dental products in accordance with the above with the aid of the said equipment is already well known and will not be described here. However, the possibility of interaction between the user 1 and the computer equipment 7 is indicated symbolically by arrows 11. Interaction between user 1 and model 2 is indicated by arrows 12. The simulation and production of the model 2 in the computer equipment 7 is shown by arrows 13. The use and supply of information between the bridge part 8, levelling table 9 and scanning equipment 10 and the user 1 and computer equipment 7 are symbolized by arrows 14, 15 and 16. Relations and interaction between the computer equipment and the production resource 6 are symbolized by 17. A manufacturing and information supply site is indicated by CE, and transmission via a telecommunications and/or computer system between the user site ASI and the site CE is indicated by arrows

18. The site CE can be regarded as central equipment in relation to the user site.

In accordance with the invention, the user 1/user site ASI subscribes to or purchases information or orders products from the system 19 in the central unit CE. The system 19 is technically complex and includes manufacturing processes for production of titanium crowns, ceramic crowns, caps, bridges, statistics, programs, etc. The various functions, machinery, information, etc., can be categorized, and Figure 1 shows the categories A, B and C. In the present case, the user 1 has purchased or subscribed to information relating to category A, which information is used by the user 1 to assist in his work and make it more efficient. This work can involve producing an angled distancing piece 3a, in which work his purchased or subscribed information, data, programs, etc., can be used to produce an actual dental assembly 3 + 3a with the computer equipment 7. In accordance with the invention, he can obtain help in producing a dental bridge 8. He can also obtain control information on his levelling table 9 and/or information on reading of an actual product. In accordance with the concept of the invention, it is also possible, as a function of his constructional and test work, to make a product with the aid of the information obtained from the system 19, and the computer equipment 7, and to order the latter in the central unit CE.

Figure 1 also shows a second user site ASII with user 20. This user has, in corresponding manner, computer equipment 21. The user 20 may be interested in another type of information than that in the case of the user 1 described above. Examples of such information are statistics from different main types of dental crowns 22, 23, 24, 25. These statistics can be used as a basis for starting up dental fitting work in or on a patient. The statistics can also be used in different combinations and assessment situations. The acquisition of the statistics from the system 19 is

symbolized by arrows 26. The user 20 uses his computer equipment 21 to send a query profile via a connection (telecommunications and/or computer connection) which is symbolized by arrows 27. The input of statistics for the dental crowns in the computer equipment is symbolized by arrows 28. The interaction between the computer equipment and the user 20 is symbolized by arrows 29. The actual query profile which is generated by the user 20 with the aid of the computer equipment 21 is sent to the central unit CE in digital form, and such a query profile is symbolized by 30. The query profile triggers selection information 31, 32, 33 and/or 34 in the central unit CE. By means of the selection information, the information on the dental crowns 22, 23, 24 and 25 can be transmitted via an actual connection 26 or 27. The user 20 can, with the aid of the information in or from the system 19 in the central unit CE, build up an actual constellation 31 which can consist of previously known parts 31a and 31b, which the user 20 needs to supplement with factual information 31c from the system. The factual information can be transmitted from the computer equipment 21 via a connection which is symbolized by arrows 32. Alternatively, the factual information can be stored up and used in the computer equipment 21. Factual information is also transmitted in digital form and is symbolized by 33. The constellation construction which is carried out by the user 20 is symbolized by arrows 34. The user can also request program information 35, 36 from the system 19. Such program information, and its relation to the system, are symbolized by arrows 37. The transfer of the program to the computer equipment 21 is symbolized by arrows 38.

Figure 2 shows that the central unit CE can comprise different units, for example production units CE1, CE2 and CE3, and a network CE4 with associated coordinating units, which are described hereinbelow.

Figure 3 shows an example of the construction of a user site/customer ASI''. In accordance with the

above, the user site can include a process scanner/reader 39 of known type, for example a Procera scanner station. The scanner station can produce a query profile which is symbolized by 40. The query profile is generated with the aid of a CADD program known per se, for example the Procera CADE program. The program handles filling-in and ordering functions in a manner known per se. The user site ASI'' also includes a modem which can be of a type known per se. Thus, for example, a modem 40 of the ISDN type can be used. The modem connects the work station, or renders it connectable, to a connection symbolized by 42 in a computer network. The network part CE4 (cf. Figure 2) comprises a number of coordinating units. Figure 3 shows three coordinating units 43, 44, 45. The coordinating units form a common network with the production units CE1', CE2', CE3' (cf. Figure 2). The network connection is symbolized by 46. The information flow, when ordering a dental cap for example, can be described by the following work stages. Reading off the plaster model, filling-in of dental data, patient, tooth, ID type, type of work, etc., processing of data file in Procera CAD, filling-in of order form and dispatching of the order. The order is implemented by the equipment being coupled up to one of the Procera coordinating units. Here, the order is received, confirmed and sent onwards to one of the production units. The different customers (cf. the users 1 and 20 in Figure 1) can couple up to one of the said coordinating units and send their order on. The coordinating units provide the possibility of access to different databases, for example product registers or other product information, cf. below. There is also the possibility of providing ongoing information on the present order and previous orders.

Figure 4 shows a coordinating unit which in principle functions as a connection station to the Procera network. The purpose of several coordinating units is, on the one hand, to be able to distribute the

incoming information flow in the form of the said orders, and, on the other hand, to distribute the outgoing information flow, which can consist, for example, of access to different databases. As the flow of information increases, with new customers and services being added, the system capacity can be increased either by connection of several coordinating units or by equipping the respective coordinating unit with more powerful computers and more modem/ISDN connections. The coordinating unit is constructed as a local network. If several coordinating units are coupled together, these can be made to act as a common network. The local network 47 is an LAN (Local Area Network). In Figure 4, a transport server is shown by 48, and an ISDN connection arranged on the latter is shown by 49. Further servers are shown by 50, 51, 52 and 53. The server 52 is connected via ISDN connections 54 and 55 and modems 56, 57, 58 and 59. The server 53 is used as file server. The server 51 is coupled up as database motor. The server 52 constitutes an RLN server (Remote Lan Node). The latter server represents the respective client and forms the input and output channel of the coordinating unit.

Figure 5 shows the data flow in a production unit. Each event in the production unit is registered in different databases. The information in the databases is sent onwards to the coordinating unit or the coordinating units. The incoming order flow is shown by 60. The incoming connection is 61. Incoming orders are registered in block 62. 63 symbolizes a library for registration of incoming orders. Orders are registered in 64, and 65 indicates a data library. File preparations are made in 66, and 67 indicates a preparation library. 68 treats data on the milling process, and 69 indicates the flow registration. 70 symbolizes database applications, where a first application 71 indicates incoming data, a second application 72 indicates financial data, a third application 73 indicates data files, a fourth

application 74 indicates file preparations, a fifth application indicates production administration data, a sixth application 76 indicates milling or machining data, and 77 constitutes address information. The coordination between the incoming flow 60 and the database applications is achieved in a manner known per se and is shown by different connections. The database applications are connected to the coordinating unit via a transport server 78 which is provided with an output connection 79.

Figure 6 shows the construction of three different product units 80, 81 and 82. The product units are designed in essentially the same manner. The different production units can constitute different types of dental products, for example titanium bridges, ceramic crowns, etc. Each production database 80, 81 and 82 has a construction corresponding to the database constellation 70 in Figure 5. An input connection is indicated by 79' and a transport server by 83. At their outputs, the database parts 80, 81 and 82 are connected to a line system 84. Connected to the latter is a system for financial reporting 85, a system for specifications 86, a system for article indexing 87, a system for customer indexing 88, a system for client registration 89, a system for client database 90, and a system for production modifications 91.

Updating of the coordinating units is done by so-called data replication. Data replication is carried out so that one has several identical databases. These databases are updated by transferring only information which has been modified since the preceding update. By using this technique, it is possible to expand the system for several users and/or several applications without limit. The database applications 85-91 work using SQL (Structured Query Language). There are therefore copies of the databases from all the production units. The databases are constantly updated by means of data replication. The database applications can then take information from the production units'

databases. The system is expanded by creating more coordinating units. The said coordinating units then receive a complete set of databases.

The invention also relates to a method using one or more computers or computer units to generate a system protocol for the process of production of a dental product, for example all or parts of one or more dental crowns, one or more dental bridges, etc., or instruments for these. The system is generated on the basis of, inter alia, a construction of the product or instrument simulated at a customer site, which can be a dental practice, dental technician's workplace, etc., in a computer environment in a manner known per se. In this case, the computer environment has access to first data concerning a basic protocol relating to production of a basic variant of the dental product or instrument. A supplementary protocol is generated by means of second data generated as a function of the construction simulated at the customer site. In an interaction between the respective computer unit and user, the system protocol is generated on the basis of the said first and second information. The basic protocol can in this case be selected from among a number of existing basic protocols which represent different variants. The basic protocol variants can be produced as a function of statistics from previous treatments in accordance with the above. The system protocol can be produced at the central unit or at the respective customer site or at one or more of the customer sites. The respective customer site is debited by means of debiting equipment (cf. above) for use of the various data from the central unit.

The invention also relates to a method and arrangement using one or more computer units to generate a program for reproducing visually on the computer screen all or part of a product, for example all or part of one or more dental bridges, one or more dental crowns, etc., or instruments for these. The generation takes into account a construction simulated

at a customer site, for example at a dental clinic, dental technician's workplace etc., in a computer environment. The said computer environment is supplied with first data attributable to a basic program for reproduction and presentation on the computer screen of a basic variant of the dental product/instrument. The said computer environment is also supplied with second data attributable to an add-on program which permits addition of characteristics to the basic variant by interaction between the computer unit/computer units in question and one or more users. The said first and second data can be transmitted from the central unit to a customer site, and the content or use time of the data in question can be priced with the aid of debiting equipment.

The methods and arrangements described above can also be characterized by the fact that the transmission between a central unit and a customer site is effected wholly or partly via the internet, i.e. the international telecommunications and/or computer network. The invention also relates to an arrangement for a system for producing dental products, in which a number of customer sites (dentists, dental technicians, etc.) are served by one or more central units which supply the respective customer site with dental products, instruments for production of dental products, information on dental products, instruments, statistics, and the like. The arrangement is in this case characterized by a queuing facility which is arranged to provide the respective customer site with details on the delivery time of the requested product/instrument or information. The operation can then be accomplished as a function of an order or request from the customer site in a manner known per se. The information in question can include concrete time indications of the delivery.

The invention is not limited to the embodiment described above, but can be modified within the scope

of the attached patent claims and the inventive concept.

PATENT CLAIMS

1. Arrangement used at an operating site to assemble individually designed dental products, for example distancing pieces, bridges, etc., where each dental product can be made up from two or more structural elements and where each operating site is arranged with computer equipment designed to reproduce a simulated model of the jaw, dentine, implant, etc., and structural elements applied to the model, and, by means of interaction with the user, to permit a constructional design of the respective assembled product which is adapted to the dental situation in question, and where the operating site can be connected to one or more central units via a telecommunications and/or computer network, via which the central unit receives data from the operating site, characterized in that the operating site is arranged to collate data in a query profile relating to part of the assembly, in that the operating site is provided with members for transmitting query profile data via the network to the central unit, in that the central unit is arranged, as a function of the received query profile data, to supply information relating to the part in question, which information can be sent to the operating site and/or can be set onwards to a production unit connected to the central unit, or included in the central unit, for production of the part, and in that a debiting system is arranged to indicate to the central unit or to the production site that the information or production, respectively, has been paid for.

2. Arrangement according to Patent Claim 1, characterized in that the query profile data relates to queries on first information concerning the dental situation, for example first information on optimum design and fitting of the part concerned in the dental product.

3. Arrangement according to Patent Claim 1 or 2, characterized in that the dental product consists of a distancing arrangement for or on an implant, which distancing arrangement comprises an angled distancing part or other part which has on or more parameters, e.g. shape, position of rotation about the longitudinal axis of the implant, etc., and which is dependent on the individuality of the dental situation.

4. Arrangement according to Patent Claim 1, 2 or 3, characterized in that the query profile data and the first information afford the possibility of interaction between the operating site's computer equipment, its user, and the central unit for production of one or more structures adapted to the dental situation.

5. Arrangement according to any of the preceding patent claims, characterized in that a number of operating sites can be connected to the central unit and its production unit(s), and in that the operating sites are categorized and each category subscribes to a relevant service which effects first information and/or product parts from the total range or offered range of the central unit and/or the production unit(s).

6. Arrangement according to any of the preceding patent claims, characterized in that the first information relates to one or more computer program information items or computer programs for carrying out the assembly.

7. Arrangement according to any of the preceding patent claims, characterized in that the query profile data of the respective operating site and the information sent from the central unit/respective production unit relates to user data and setting data for the scanner unit, measuring table, etc.

8. Arrangement used at a dental user site to assemble qualified constellations, for example with regard to dental situations, dental information, dental test products, etc., where the user site has access to its own result or results or presentation bank(s) and can be subject to factual information relating to, for

example, verifications, adjustments with complementary additions, etc., where the user site can be connected to one or more central units via a first telecommunications and/or computer network, via which the site and the unit are capable of exchanging information/data, characterized in that the user site is arranged to collate data in a query profile relating to all or part of the constellation, in that the user site is provided with members for transmitting query profile data via the first network to the central unit, in that the central unit is arranged, as a function of the query profile data received, to supply factual information relating to the constellation(s), which information can be sent back to the user site for acting on the said results or presentation band(s), and in that a debiting system is arranged to indicate to the central unit that the factual information sent back has been paid for.

9. Arrangement according to Patent Claim 8, characterized in that the returned factual information relates to second information on manufacturing process(es) and/or statistics relating to dental products, dental situations, etc.

10. Arrangement according to Patent Claim 8 or 9, characterized in that the central unit also functions as, or is connected to, one or more production units for production of dental products and/or instruments for these, and in that the central unit and/or the respective production unit is arranged to manufacture, analyse and store characteristic data on the dental products, data on the respective dental situation in which the respective dental product is being used, etc., and in that characteristic data and dental situations thus manufactured and stored can be interrogated by means of the said query profile or the said query profiles from one or more user sites connected to the central unit and/or the respective production unit.

11. Arrangement according to Patent Claim 8, 9 or 10, characterized in that the respective query profile data and returned information concern characteristics or construction information on different types of dental crown configurations which have been the object of production in association with manufacture/ production controlled or managed by the central unit, and in that the said types form main types which can each be supplemented by one or more variants of the main type in question.

12. Arrangement to permit manufacture of dental products, or instruments for the latter, at a number of geographically distinct manufacturing sites where the manufacturing procedure can be effected in a number of manufacturing stages, for example reading off the product's or the instrument's inner and/or outer shapes, transformation and transmission of the respective read-off results, representation of the read-off result in a computer environment, input of adjustments and/or additions to the representation represented in the computer environment, physical production of the product or instrument from or with a blank, testing of the dental product on patient, etc., characterized in that a central unit supplies moduled information items and means for carrying out the stages, in which the different modules can be assigned to the different manufacturing stages or part thereof, in that the different manufacturing stages are capable of interrogating and/or are assigned in advance one or more of the said moduled information items and means in order to be able to carry out all or part of the manufacturing process by means of the called-up information items and means, in that transmission members are arranged, as a function of the requested order for called-up information, to effect transmission of these on a computer and/or telecommunications medium which connects the respective manufacturing site to the central unit, and in that debiting systems are arranged

to credit the central unit with payment for used time, information and/or means.

13. Arrangement according to Patent Claim 12, characterized in that the customers are categorized in such a way that a first category of customer(s) can be assigned first information and means, a second category of customer(s) can be assigned second information and means, etc.

14. Arrangement according to Patent Claim 12 or 13, characterized in that the information and means comprises control information for operating equipment for one or more of the said manufacturing stages at the manufacturing site.

15. Arrangement used at one or more manufacturing sites to control a manufacturing procedure for a dental product or instrument for this, where the manufacturing procedure comprises one or more subsidiary stages, for example reading-off the product's or instrument's inner and/or outer shapes, transformation and transfer of the respective read-off result, representation of the read-off result in a computer environment, input of adjustments and/or additions to the representation represented in the computer environment, physical production of the product or instrument from or with a blank, testing of the dental product on a patient, etc., characterized in that control information for equipment effecting one or more manufacturing procedures or subsidiary stages thereof can be extracted by a selection procedure from an information and/or data bank located in a unit geographically separated from the respective manufacturing site, in that extraction can be initiated by means of the selection made at the respective manufacturing site, in that the selection made can be transferred via a computer and/or telecommunications medium to effect selection in the information and/or data bank at the central unit, in that the central unit transmits the selected information/means to the requesting manufacturing site, in that the selected information

received at the last-mentioned manufacturing site is arranged to be included in or be converted to control information for the equipment in question, and in that debiting equipment is arranged to credit the central unit with payment for used time, information and/or means.

16. System for supplying dental products and preferably information relating to the products and dental situations and, if appropriate, instruments for production of the products, in which a number of users using the system and constituting user sites are connected to one or more central units, included in the system, via a first computer and/or telecommunications network, and the respective user site is provided with computer equipment by means of which the query profile can be collated, characterized in that the said central unit(s) comprise(s) one or more coordinating units which, via the first telecommunications and/or computer network or a second telecommunications and/or computer network, is/are connected to one or more production units, in that the respective coordinating unit is arranged to effect or participate in the assignment of the information flows coming from the user sites via the first telecommunications and/or computer network (query profiles/query profile data), and in that the respective production unit functions as order receiver for the respective dental product which the respective user site wishes to have produced.

17. System according to Patent Claim 16, characterized in that the respective user site is equipped with function(s) for reading off the model or jaw, dentine, etc., in different dental situations, in that the reading result can be fed to the user site's computer equipment, and in that a query profile (systems user profile) set up by this means also includes one or more of the following task functions: filling in of dental data, patient, tooth, identification of type of work, processing of data profile in the computer equipment, filling in of order

forms, and transmission of the order via the first telecommunications and/or computer network.

18. System according to Patent Claim 16 or 17, characterized in that the respective coordinating unit functions as a connection station to a network, telecommunications network and/or computer network belonging to the system, and in that two or more coordinating units allocate the incoming query profile flow (systems user flow) and the flow of information coming out of the coordinating units, which, for example, are to be given access to different databases.

19. System according to any of Patent Claims 16 to 18, characterized in that the system capacity can be expanded by connection of further coordinating units and/or fitting of more powerful computers in existing coordinating units and/or connection of several ISDN (Integrated Service Data Network) modems.

20. System according to any of Patent Claims 16 to 19, characterized in that the said first and/or second telecommunications and/or computer networks form(s) a local telecommunications and/or computer network in relation to the public telecommunications and/or computer network.

21. System according to any of Patent Claims 16 to 19, characterized in that the respective coordinating unit is provided with or is connected to a file server which functions as drive for the respective database used.

22. System according to any of Patent Claims 16 to 21, characterized in that the coordinating units can be updated with the aid of a data replication function which comprises two or more databases.

23. System according to any of Patent Claims 16 to 22, characterized in that all the production units work in essentially the same way, with possible differences in the product types that can be manufactured, differences in the machinery used, capacities, and/or the structure of the internal routines.

24. System according to any of Patent Claims 16 to 23, characterized in that the debiting and/or finance system used is arranged centrally in the overall system, and in that the respective production unit is arranged to generate a database register comprising financial database and/or production follow-up, etc.

25. System according to any of Patent Claims 16 to 24, characterized in that, in the respective production unit, incoming data can be received in an incoming registration member from which incoming data can be processed in an incoming data library, word register, data library, file preparation members, preparation library, milling process treatment, and final registration, and in that database applications include the organization of incoming files, finance, data files, file preparations, product administrations, milling treatment register and address functions.

26. System according to any of Patent Claims 16 to 25, characterized in that it comprises two or more production databases which receive data from a transport server which is linked to a digital line, in that the respective production database has files for file arrival, finance, data files, file preparations, product administrations, milling registration treatment, and addresses, in that the files in the said two or more production databases are connected via their outputs to a bus connection to which factual information on finance reports, specifications, article index, customer register, client registration, client databases, and production changes are connected.

27. System according to any of Patent Claims 16 to 26, characterized in that updating is performed by so-called downward compatibility, which will make it possible to minimize the rumber of program versions the system is working with, and in that the respective new or altered program is checked out according to a sequence on installation.

28. Method using one or more computer units to generate a system protocol for the process of

production of dental products, for example all or parts of dental crowns, dental bridges, etc., or instruments for these, where the system is generated on the basis of, inter alia, a construction of the product/instrument simulated at a customer site (dentist, dental technician, etc.) in a computer environment, characterized in that, in the said computer environment, first data is supplied concerning a basic protocol relating to production of a basic variant of the dental product/instrument, in that a supplementary protocol is generated by means of second data generated as a function of the construction simulated at the customer site, and in that, in an interaction between the computer unit(s) and a user, the system protocol is generated on the basis of the said first and second information.

29. Method according to Patent Claim 28, characterized in that the basic protocol in question is selected from among a number of existing (tried and tested, established) basic protocols which represent different basic variants.

30. Method according to Patent Claim 28 or 29, characterized in that the said first data is supplied by a central unit serving one or more customer sites, in that the said first data, or third data attributable to the first data, is transferred to the customer site concerned, preferably via a telecommunications and/or computer network, and in that a visual reproduction of the basic variant is presented on computer equipment (screen) located in the said computer environment at the customer site, in that the structural characteristics in question are added to the visual reproduction, which characteristics, in the computer equipment, bring about generation of the said second data or fourth data attributable to the second data.

31. Method according to Patent Claim 30, characterized in that the said second or fourth data is returned to the central unit which utilizes the said

second data, or the said second data generated from the said fourth data, to permit the said interaction.

32. Method according to Patent Claim 30, characterized in that the said second data or fourth data is used at the customer site to permit the interaction at the customer site.

33. Method according to Patent Claims 28 to 32, characterized in that debiting members are arranged to debit transmissions and/or use times of information and data which is transmitted from the central unit to the respective customer site.

34. Method using one or more computer units to generate a program for reproducing visually on the computer screen all or part of a dental product, for example all or part of dental crown(s), dental bridge(s), etc., or instruments for these, where the generation takes into account an instruction simulated at a customer site (dentist, dental technician, etc.) in the computer environment, characterized in that the said computer environment is supplied with first data attributable to a basic program for reproduction and presentation on the computer screen of a basic variant of the dental product/instrument, and in that the said computer environment is supplied with second data attributable to an add-on program which permits addition of characteristics to the basic variant by interaction between the computer unit(s) and user.

35. Method according to Patent Claim 34, characterized in that the said first and second data are transmitted from a central unit serving several customer sites via a telecommunications and/or computer network, and in that a debiting function is arranged to register use/use times of the data in question.

36. Method according to any of the preceding patent claims, characterized in that transmission between the central unit and the respective customer site served by the latter is effected wholly or partly via the internet, i.e. the international telecommunications and/or computer network.

37. Arrangement for a system for producing dental products, in which a number of customer sites (dentists, dental technicians) etc., are served by one or more central units which supply the respective customer site with dental products, instruments for production of dental products, information on dental products, instruments, statistics, and the like, characterized in that a queuing facility is arranged to provide the respective customer site with details on the delivery time of the requested product/instrument or information.

38. Arrangement according to Patent Claim 37, characterized in that the details include concrete time indications of the delivery.

Fig. 1

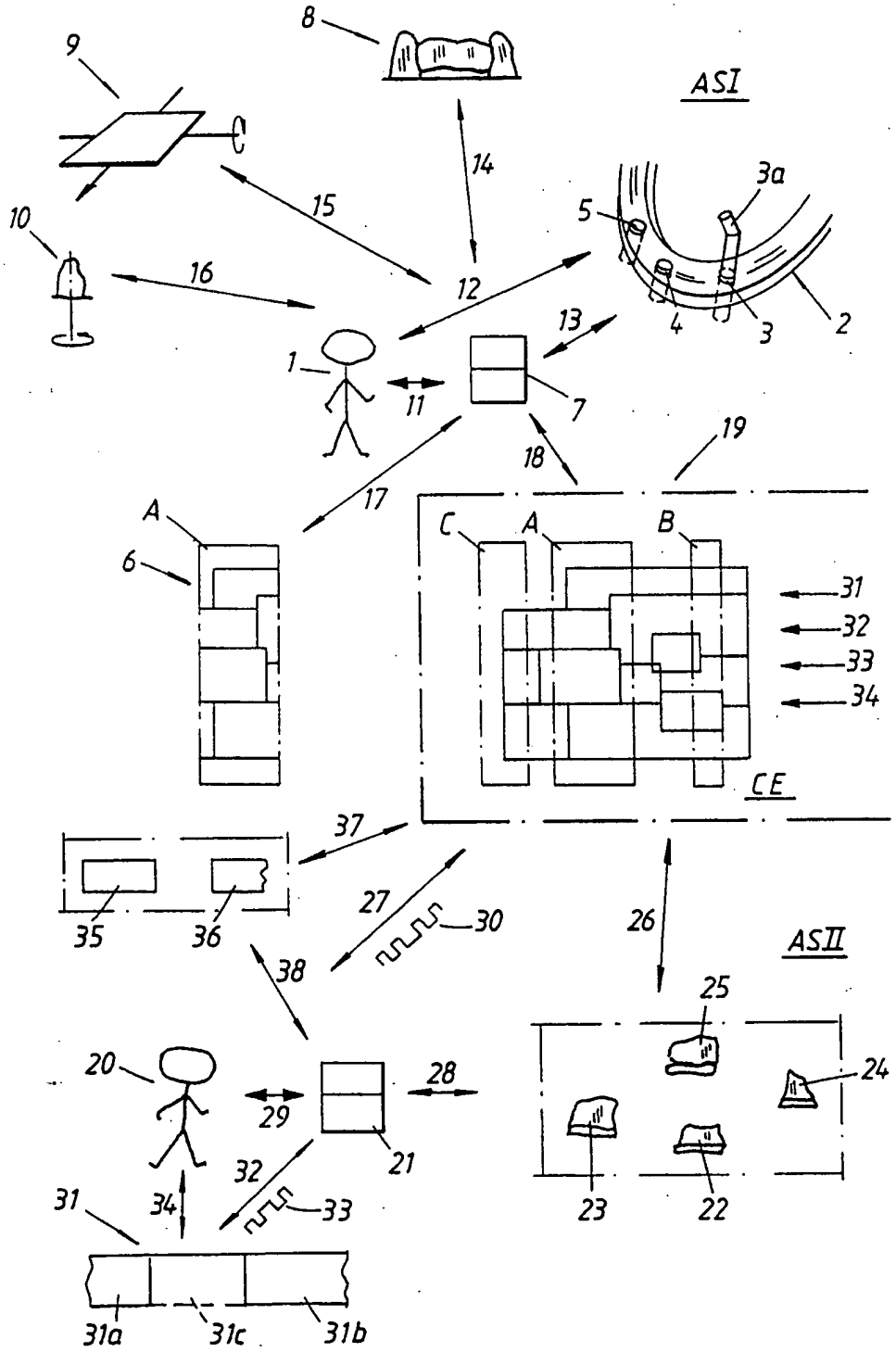
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Fig. 2

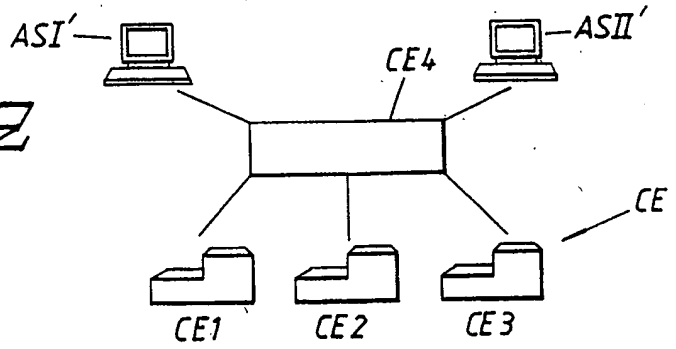


Fig. 3

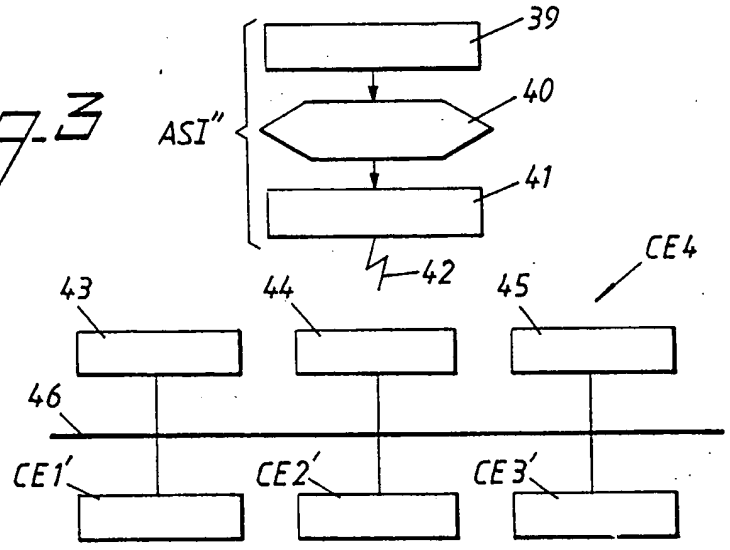
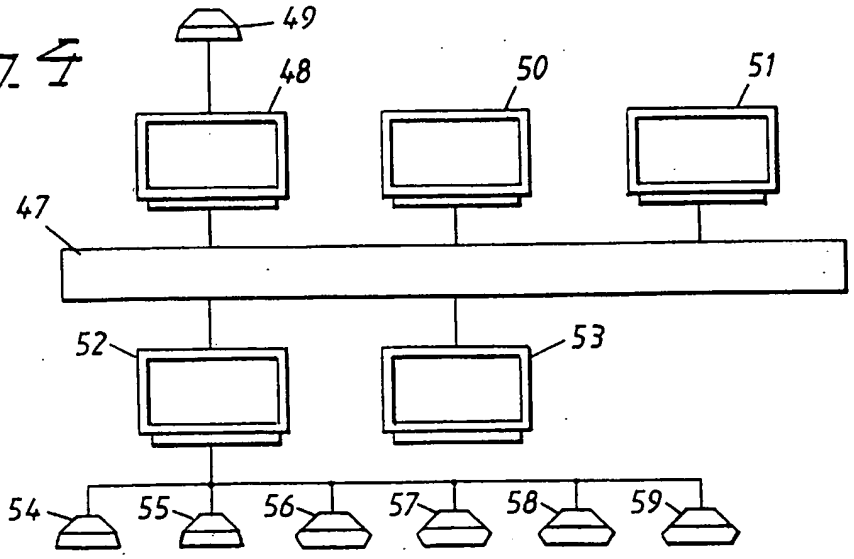


Fig. 4



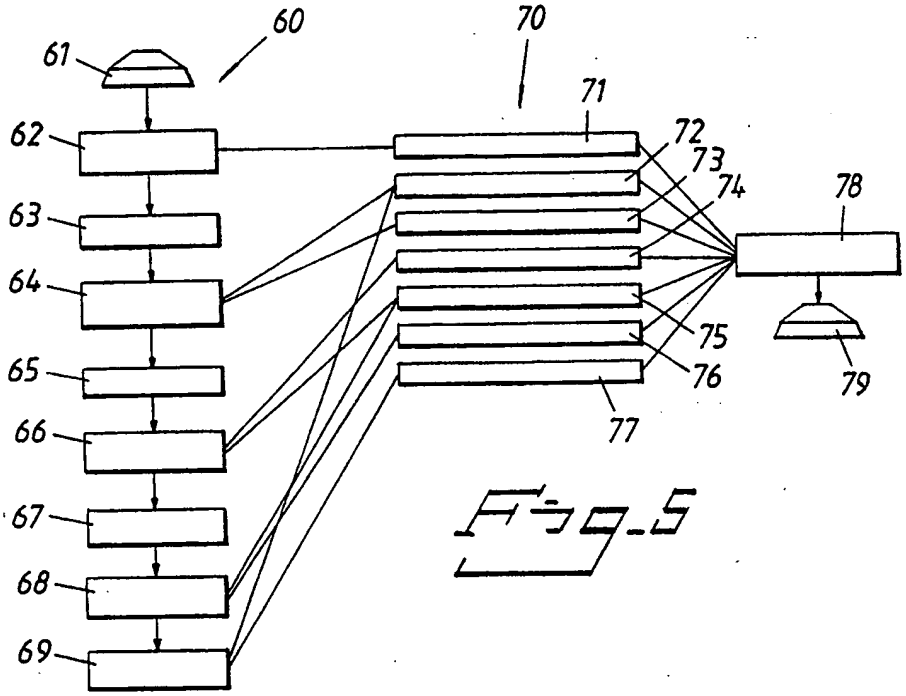

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Fig. 5

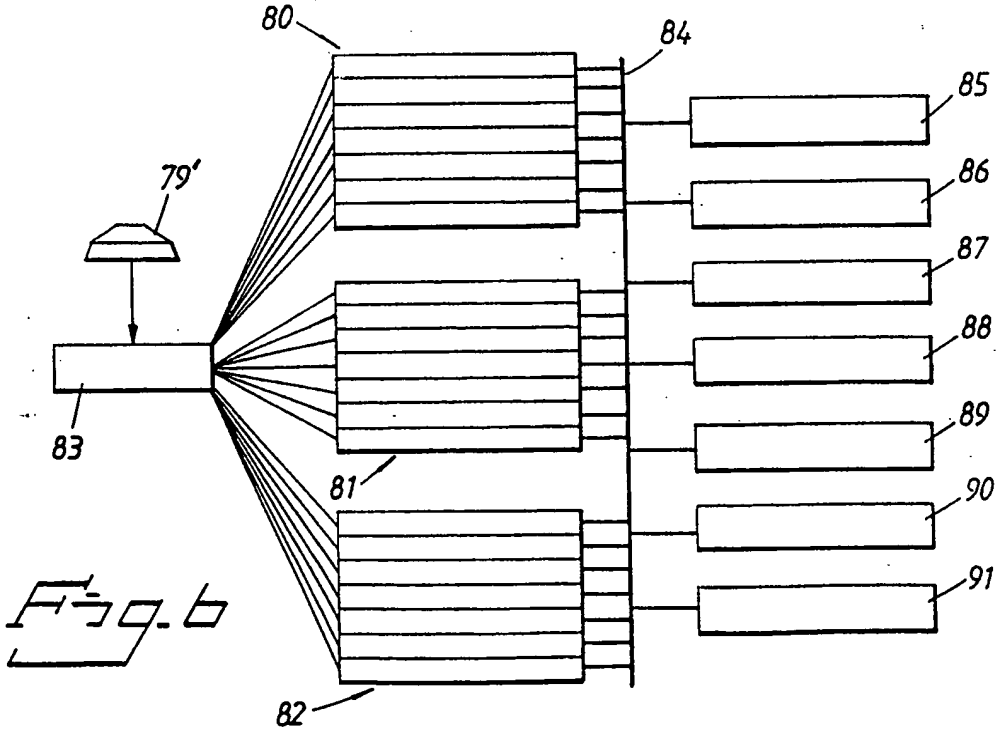
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Fig. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 98/00493

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61C 13/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9515731 A1 (NOBELPHARMA AB), 15 June 1995 (15.06.95) --	1-38
A	WO 9637163 A1 (SIEMENS AKTIENGESELLSCHAFT), 28 November 1996 (28.11.96) -- --------	1-38

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 July 1998	21-07-1998
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Jack Hedlund Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

30/06/98

International application No.
PCT/SE 98/00493

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9515731 A1	15/06/95	AU 682083 B	18/09/97
		AU 1251695 A	27/06/95
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		JP 8509150 T	01/10/96
		SE 502035 C	24/07/95
		SE 9304042 A	07/06/95
WO 9637163 A1	28/11/96	DE 19518702 A	28/11/96